General

Guideline Title

Cardiac rehabilitation delivery model for low-resource settings: an International Council of Cardiovascular Prevention and Rehabilitation consensus statement.

Bibliographic Source(s)

Grace SL, Turk-Adawi KI, Contractor A, Atrey A, Campbell NR, Derman W, Ghisi GL, Sarkar BK, Yeo TJ, Lopez-Jimenez F, Buckley J, Hu D, Sarrafzadegan N. Cardiac rehabilitation delivery model for low-resource settings: an International Council of Cardiovascular Prevention and Rehabilitation consensus statement. Prog Cardiovasc Dis. 2016 Nov-Dec;59(3):303-22. [171 references] PubMed

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Recommendations

Major Recommendations

Definitions of the strength of evidence (High, Moderate, Low, and Very low) are provided at the end of the "Major Recommendations" field.

Intervention Recommendations for Delivery of the Core Components of Cardiac Rehabilitation (CR) in Low-Resource Setting, with Level of Evidence

1. Exercise
    a. Programmes of exercise should, wherever feasible, be offered to all subjects recovering from major coronary heart disease (CHD) events. (World Health Organization, 2003; Antunes-Correa et al., 2012; Chan, Tang, & Jones, 2008; Digenio et al., 1991; Ghashghaei et al., 2012; Sadeghi et al., 2012; Sadeghi, Ghashghaei, & Rouhafza, 2012; Sadeghi et al, 2013; Sadeghi et al., 2015; Shabani et al, 2010; Soleimani et al., 2008) (Low-income and middle-income countries [LMICs]—low quality of evidence)
    b. The frequency goal should be to conduct exercise training on at least 3 days but preferably on most days of the week. (Consensus based)
    c. If an exercise electrocardiogram (ECG) has been conducted prior to exercise, the heart rate during exercise should be kept below the symptomatic threshold. If no exercise ECG has been possible then the presence of chest pain induced by exercise and relieved by rest or nitroglycerin warrants evaluation prior to initiating exercise at intensities at or above this intensity. Without an exercise ECG, the recommended exercise training intensity should be in the light and moderate ranges. (Consensus based)
    d. The duration of aerobic exercise training would depend on the patient's initial functional capacity and progression in the programme and might start with a 10-min bout of aerobic exercise and gradually progress to 60 min per session at a rate of about 10% to 20% in

duration per week. Warm-up and cool-down activities would precede and follow the aerobic exercise bout. (Consensus based)

e. Patients at lower risk or who have completed a period of supervised rehabilitation can be promoted to exercise safely in a home-based or community setting. Supervised exercise setting is for high-risk patients. (Haddadzadeh et al., 2011; Servantes et al., 2012) (LMICs—low quality of evidence)

f. Walking is the preferred mode of exercise, as it is no-cost. However, non-weight-bearing exercise is recommended for patients with musculoskeletal pain or limitations. This should be augmented with resistance training where possible. (Consensus based)

2. Diet

a. *Fruits and Vegetables*
Consumed in abundance as affordable, particularly locally grown fruits and vegetables. At least 400 g/day (i.e., five portions), but ideally double this. There should be a greater intake of vegetables than fruit. (Dauchet, Amouyel, & Dallongeville, 2005; Dauchet et al., 2006) (High-income countries [HIC]—high quality of evidence) Having a variety of different coloured fruit and/or vegetables daily will aid a diverse micronutrient intake. A maximum of one glass (150 mL) of fruit juice each day. (Consensus based)

b. *Whole Grains and Fibre*
Should be incorporated into the diet in the least refined and highest fibre form. (Pereira et al., 2004) (HICs—moderate quality of evidence)

Refined starches and sugars along with sugar-sweetened beverages should be limited. (Malik et al., 2010) (HICs—moderate quality of evidence)

c. *Dietary Fat*
The primary source of fat should be an unsaturated fat (olive oil, sunflower oil, canola/rapeseed oil) replacing saturated fat (lard, butter) where possible. (Hooper et al., 2012; Mozaffarian, Micha, & Wallace, 2010) Trans fatty acids (partially hydrogenated fat) should be avoided. (HICs—high quality of evidence)

d. *Salt*
Less than 5 g salt/2000 mg sodium per day. (World Health Organization, 2012) Reduction of processed, smoked, cured, bread and cereal products will aid achievement. (HICs—high quality of evidence)

e. *Protein*
Use fish, poultry, nuts and legumes as an alternative to fatty red or processed meats. For those living in coastal areas, eating fish caught locally may be more affordable. (Consensus based)

f. *Dairy Products*
These are non-essential although can be useful sources of protein or calcium for some; there is no benefit from a high intake. (Consensus based)

g. *Vitamin and Mineral Supplements*
Not required if a balanced diet is consumed, unless indicated by other conditions. (Consensus based)

h. *Patients with Raised Low-Density Lipoprotein Cholesterol (LDL-C)*
The incorporation of stanol and sterol ester products can be encouraged in the correct dose. (Talati et al., 2010) (HICs—moderate quality of evidence)

3. Tobacco

Psychological Interventions

a. For all patients: brief advice from trained health professional or physician: Brief opportunistic advice consists of up to 30 min of discussion with patients aimed at prompting a quit attempt and in some cases enhancing chances of the success of that quit attempt. It can be provided by a physician, nurse or trained health personnel at the CR facility. It may include advice to stop, providing information about the health consequences of smoking, how the different components of cigarette smoke cause harm, the benefits of quitting, advice on methods of quitting and in some cases offer of further support. (Kumar, Sarma, & Thankappan, 2012) (LMICs—high quality of evidence)

Pharmacological Interventions Where Available: Non-physician Based

b. Nicotine Replacement Therapy (NRT)
NRT products are recommended for all smokers and smokeless tobacco users with stable cardiovascular disease and those who have suffered an acute event on hospital discharge. (Stead et al., 2012; Woolf et al., 2012) Those with unstable disease should be

assessed by a cardiologist prior to NRT use. (HICs—high quality of evidence)

Pharmacological Interventions Options for Physicians: Based on Availability, Affordability and Individual Patient Profile

c. Where a physician and the medications are available and affordable, patients should be offered bupropion, cytisine or varenicline. (Jorenby, 2002; Jorenby et al., 2006; Etter, 2006; West et al., 2011) (HICs—moderate quality of evidence)

4. Body Weight/Composition
    a. All patients with established CHD should have serial (e.g., every 6 months) monitoring of body mass index (BMI) and waist circumference. (Consensus based)
    b. In individuals who are overweight (BMI>25) or obese (BMI>30), a combination of weight loss, dietary changes and physical activity is recommended. (Sadeghi, Ghashghaei, & Rouhafza, 2012; Sarrafzadegan et al., "Gender differences," 2008) (LMICs—moderate quality of evidence)
5. Education
    a. Patient education should be personalised, led by trained staff, with regular contact between staff and patients. It should be delivered in individual and/or group settings and if possible, include family members and caregivers. Patient's specific health goals should be discussed. (Consensus based)
    b. The aim of education should be to influence health beliefs, to elicit positive emotions, to increase optimism about the possibility of change and to heighten the salience of personal experience or other evidence supporting self-efficacy. Consensus based)
    c. In addition to education on physical activity, risk factor control, smoking cessation and drug treatment (where feasible), dietary education should be given in terms of food not nutrients, at an appropriate level, in order to facilitate informed healthy choices. Advice should be adapted to meet the specific needs of the patient in the context of his/her family, taking into account factors such as age, culture and lifestyle. For maximum benefit, any targets should be realistic for the longer-term to ensure life-long maintenance. (Consensus based)
6. Mental Health
    a. Where CR programmes have access to healthcare professionals capable of: (1) undertaking diagnostic interviews for depression and (2) providing collaborative, stepped depression treatment for those with a positive diagnosis, patients should be screened for depression. (Consensus based)
    b. Patients who receive a positive depression diagnosis should be encouraged to adhere to CR to achieve the mental health benefits. (Dehdari et al., 2007; Kulcu et al., 2007; Poortaghi et al., 2011) (LMICs—moderate quality of evidence)
    c. Depression treatment with antidepressants and/or psychotherapy should be based on patient preference and availability. Response to therapy should be monitored, and stepped where inadequate symptom reduction is achieved. (Davidson et al., 2013) (HICs—moderate quality of evidence)
    Treatment should be communicated with the CR team. (Consensus based)

    d. CR programmes should offer stress management, where a trained healthcare provider is available. (Whalley et al., 2011) (HICs—moderate quality of evidence)
7. Return to Work
    a. All CR patients should undergo assessment of occupational type, employment status and desired occupational status. (Consensus based)
    b. Patients with physically demanding occupations or jobs involving public safety should undergo risk evaluation prior to return to work. Where available, treadmill testing is recommended as the modality of choice for exercise assessment, to ascertain ischaemic threshold, and electrical instability. The 6-min walk test is a viable alternative where resources do not permit treadmill testing. (Consensus based)
    c. Low-risk individuals are those with no angina symptoms and with good functional status (able to perform >7 metabolic equivalents [METS] of work). These patients can return to work within 2 weeks of their event, preferably with some initial CR programming and a plan for ongoing contact and support. (Kovoor et al., 2006) (HICs—moderate quality of evidence)
8. Lipids
    a. All patients with established CHD should have baseline and subsequent (e.g., every 3–6 months) on treatment lipid profile assessments where available. (Consensus based)
    b. A combination of lifestyle modifications (including dietary changes and physical activity) and pharmacotherapy (where available and affordable) is recommended for all patients. (Sarrafzadegan et al., "Gender differences," 2008; Sarrafzadegan et al., "Changes," 2008) (LMICs—moderate quality of evidence)
    c. Statin therapy, unless contraindicated (in patients with known allergic reactions to statins, active liver disease, as well as in pregnant and lactating women), is warranted for all patients with established CHD, regardless of capacity to test for baseline lipid levels. Absence of blood draw should not be a barrier to prescription of statins. Type and dose of statin is dependent on region/country-

specific cost-effectiveness analysis, availability and affordability. Ideally, this should be titrated to achieve a target LDL-C of <70 mg/dL (Expert Dyslipidemia Panel of the International Atherosclerosis Society Panel members, 2014), or to achieve ≥50% reduction in baseline LDL-C. (Lopez-Jimenez et al., 2014) (HICs—high quality of evidence)

9. Hypertension Control
    a. All people who have CHD and heart failure are recommended to have blood pressure (BP) assessed at initial CR sessions. Where feasible, multiple BP readings including out of office BP readings (readings in community settings, pharmacies, home) should be used to supplement readings performed in CR sessions. People with high readings assessed in a quiet, comfortable environment (i.e., ≥140/90 mm Hg) at two or more visits can be diagnosed with hypertension, while hypertensive urgencies and emergencies are diagnosed immediately. People on treatment for hypertension with BP readings <140/90 mm Hg are also considered to have hypertension. (Gee et al., 2014) (HICs—moderate quality of evidence)
    b. Lifestyle behaviour advice for people with hypertension as outlined previously in this document is a core aspect of hypertension management. (Sarrafzadegan et al., "Gender differences," 2008; Sarrafzadegan et al., "Changes," 2008) (LMICs—moderate quality of evidence)
    c. Where available, antihypertensive medications, outlined in the cardioprotective point below should be used in specific clinical circumstances (e.g., angiotensin-converting enzyme [ACE] inhibitors in heart failure) (see point 10 below).
    d. Achieving the target BP (<140/90 mm Hg) should be the primary clinical focus (Dasgupta et al., 2014; Mancia et al., 2013; Sanchez et al., 2009; Fleg et al., 2013). Diuretic is often the most affordable and accessible antihypertensive medication. BP control generally requires more than one drug and when three or more drugs are required, barring contraindication, one should be a diuretic. (Dasgupta et al., 2014; Mancia et al., 2013; Sanchez et al., 2009; Weber et al., 2014; National Clinical Guidelines Centre, 2004; Rosendorff et al., 2015) (HICs—moderate quality of evidence)
    e. In people with heart failure, an aldosterone antagonist is indicated where available and affordable. (Dasgupta et al., 2014; Mancia et al., 2013; Sanchez et al., 2009; Weber et al., 2014; Rosendorff et al., 2015) (HICs—moderate quality of evidence)
    f. In people with heart failure, non-dihydropyridine calcium channel blockers should not be used. (Dasgupta et al., 2014; Mancia et al., 2013; Sanchez et al., 2009; Weber et al., 2014; Rosendorff et al., 2015) (HICs—moderate quality of evidence)
    g. In people with CHD, hypotension and reducing diastolic pressure below 60 mm Hg should be avoided. Therefore, short-acting potent oral agents like nifedipine capsules should not be used. (Dasgupta et al., 2014; Fleg et al., 2013; Rosendorff et al., 2015; Furberg, Psaty, & Meyer, 1995; Rosendorff et al., 2007) (HICs—moderate quality of evidence)

10. Cardioprotective Therapies

    Access to cardioprotective therapies can be limited in LMICs. The recommendations below are only pertinent to regions where these medications are available, affordable and accessible. Unless there is a specific contraindication, history of allergy or definite history of intolerance, the following cardioprotective medications should be prescribed universally in specific scenarios as described below:

    a. *Antiplatelet Therapy*
        1. Low-dose aspirin in doses from 75 to 150 mg a day is recommended for all patients with a history of CHD, including those who have been revascularised. (Antithrombotic Trialists' Collaboration, 2002) (HICs—moderate level of evidence)
        2. Higher doses of aspirin have not demonstrated greater clinical benefit, and they increase the risk for gastrointestinal bleeding or ulcers. For patients intolerant or allergic to aspirin, clopidogrel at a dose of 75 mg a day can be used. (Antithrombotic Trialists' Collaboration, 2002) (HICs—moderate level of evidence)
        3. Dual antiplatelet therapy (aspirin plus clopidogrel or equivalent) is indicated in patients undergoing percutaneous coronary revascularisation with stents and is recommended for 1 year if they received a drug-eluting stent or for at least 3 months if they received a bare metal stent. (Ferreira-González et al., 2012) (HICs—moderate quality of evidence)
        4. Dual antiplatelet therapy is also recommended in patients with a history of recurrent coronary events despite appropriate medical therapy including aspirin. (Consensus based)
    b. *ACE Inhibitors*
        1. ACE inhibitors are recommended in all patients with type 1 or type 2 diabetes mellitus, in patients with a left ventricular ejection fraction of <40% even in the absence of coronary or atherosclerotic vascular disease, and in patients with a recent anterior myocardial infarction. (Smith et al., 2011) (HICs—moderate level of evidence)
        2. Angiotensin receptor blockers should also be considered. (Pfeffer et al., 2003) (HICs—moderate level of evidence)
    c. *β-Blockers*

        β-Blockers are indicated in all patients after an ST elevation or non-ST elevation myocardial infarction, in patients with documented ischaemia or clinical angina, and in patients with a left ventricular ejection fraction below 40%, even in the absence of coronary disease. (Smith et al., 2011) (HICs—high level of evidence)

    d. *Statins*

        Statins are recommended in every patient with CHD regardless of pre-CR lipid values. Further details on the use of lipid-lowering

therapy are provided in point 8 above.

e. Patient education and counselling shall be provided to optimise patient medication adherence. (Schedlbauer, Davies, & Fahey, 2010) (HICs—high level of evidence)

Definitions

Grading of Recommendations Assessment, Development and Evaluation (GRADE) Definitions of Quality of Evidence

High	The panel is very confident that the true effect lies close to that of the estimate of the effect.
Moderate	The panel is moderately confident in the effect estimate. The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low	The panel's confidence in the effect estimate is limited. The true effect may be substantially different from the estimate of the effect.
Very low	The panel has very little confidence in the effect estimate. The true effect is likely to be substantially different from the estimate of effect.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Cardiovascular disease (coronary heart disease [CHD] or heart failure)

Guideline Category

Counseling

Management

Prevention

Rehabilitation

Risk Assessment

Clinical Specialty

Cardiology

Family Practice

Internal Medicine

Nutrition

Intended Users

Advanced Practice Nurses

Allied Health Personnel

Dietitians

Health Care Providers

Nurses

Physical Therapists

Physician Assistants

Physicians

Psychologists/Non-physician Behavioral Health Clinicians

Public Health Departments

Guideline Objective(s)

To develop practical, evidence-based recommendations on how to deliver each of the core components of cardiac rehabilitation, namely (1) initial assessment; (2) lifestyle risk factor management (i.e., physical activity, diet, tobacco, and mental health); (3) medical risk factor management (e.g., lipid control, blood pressure control); (4) education for self-management; (5) return to work; and (6) outcome assessment

Target Population

Adults with coronary heart disease (CHD) or heart failure in low- or middle-income countries

Interventions and Practices Considered

1. Exercise program
2. Dietary interventions
    - Fruit and vegetable intake
    - Whole grains and fibre intake
    - Dietary fat intake
    - Reduced salt intake
    - Protein intake
    - Dairy products intake
    - Vitamin and mineral supplements
    - Stanol and sterol ester products
3. Interventions to reduce tobacco consumption
    - Psychological interventions
    - Nicotine replacement therapy
    - Bupropion
    - Cytisine
    - Varenicline
4. Monitoring of body mass index (BMI) and waist circumference and interventions for overweight
5. Patient education on physical activity, risk factor control, smoking cessation, drug treatment, and diet
6. Assessment for and treatment of depression, including drug therapy, counselling, and stress control
7. Assessment of ability to return to work
8. Lipid profile assessment and treatment of abnormal lipid profile (lifestyle modifications, statin therapy)
9. Blood pressure assessment and hypertension control
    - Lifestyle behaviour advice
    - Diuretics
    - Aldosterone antagonist

- Non-dihydropyridine calcium channel blockers (not recommended)
- Nifedipine (not recommended)

10. Cardioprotective therapies
    - Antiplatelet therapy (low-dose aspirin, clopidogrel, or aspirin plus clopidogrel)
    - Angiotensin-converting enzyme (ACE) inhibitors
    - Angiotensin receptor blockers
    - β-blockers
    - Statins
    - Patient education and counseling on medication adherence

Major Outcomes Considered

- Functional capacity
- Tobacco abstention
- Dietary habits
- Body mass index
- Level of total cholesterol, low-density lipoprotein (LDL)-cholesterol and triglycerides
- Changes in blood pressure
- Depressive symptoms
- Unplanned hospitalization
- Health-related quality of life (QOL)

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Middle-Income Countries (MICs) Literature Review

The development of the consensus statement began with a review of the literature, with an eye to identifying low-cost approaches to delivering the core components of cardiac rehabilitation (CR) in middle-income countries (MICs). With regard to patient population, the statement pertains to adults with coronary heart disease (CHD) or heart failure.

A comprehensive search was conducted starting on March 1, 2014. Medline and Excerpta Medica Database (EMBASE) were searched using a main strategy for CR in low- and middle-income countries (MICs) and 9 sub-search strategies including CR models and core CR components (e.g., physical activity/exercise, psychological therapy, nutrition, blood pressure). Additionally, Google Scholar, World Health Organization (WHO) publications, and the authors' personal collections of journal articles and references from key articles were used. Studies and conference abstracts published in the English language were searched. No year of publication restriction was imposed. Case studies and editorials were not included. The main terms that were searched included CR, heart diseases, cardiac procedures, CR components and associated terms, with low-income countries and middle-income countries as a term as well as each individual country. Overall, 1417 citations were identified, and 25 studies from MICs were ultimately included.

Number of Source Documents

There are 53 documents supporting the recommendations.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Grading of Recommendations Assessment, Development and Evaluation (GRADE) Definitions of Quality of Evidence

High	The Committee is very confident that the true effect lies close to that of the estimate of the effect.
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Low	The Committee's confidence in the effect estimate is limited. The true effect may be substantially different from the estimate of the effect.
Very low	The Committee has very little confidence in the effect estimate. The true effect is likely to be substantially different from the estimate of effect.

Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

Using a modified Grading Recommendations Assessment, Development and Evaluation (GRADE) approach, the level of evidence for each of the recommendations was ascertained. If no evidence from low- and middle-income countries (LMICs) existed, evidence from high-income countries was considered. If this was not available, a consensus process was undertaken.

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

Statement Development

Two International Council of Cardiovascular Prevention and Rehabilitation (ICCPR) members were selected by the Executive to co-chair the primary writing panel for the consensus statement.

The co-chairs developed an outline and the process, and consulted with the ICCPR, World Health Organization (WHO) and the World Heart Federation to:

- Review the statement development process
- Request suggestions for the composition of the primary and advisory writing panels to ensure representation from major regions of the world and content expertise
- Solicit input on the statement outline
- Consider knowledge translation

The writing panels were populated, with each author on the primary writing panel assigned a core component of cardiac rehabilitation (CR). As per the ICCPR Charter, these components include health behavior and education interventions of physical activity and exercise, nutrition, psychological health, and smoking cessation. Secondary prevention including blood pressure and cholesterol management and the prescription of cardio-protective medication also forms an integral part of CR. Finally, attention to cost, affordability and return-to-work are of particular

importance to CR in middle-income countries (MICs) and hence section authors were also assigned in these domains.

Recommendation Development

Each section author developed recommendations related to their core component. Corresponding citations from low-income and middle-income countries (LMICs) were provided to support the recommendations where available, based on the results of the literature review. For recommendations where there was no LMIC evidence available, evidence from high-income countries (HICs) was considered. Using a modified Grading Recommendations Assessment, Development and Evaluation (GRADE) approach, the level of evidence for each of the recommendations was ascertained. If no evidence existed, a consensus process was undertaken.

First the drafted recommendations were circulated to all primary writing panel members, who were asked to rate each recommendation on a 7-point Likert scale in terms of scientific acceptability, feasibility and importance, as well as overall. There was also a request for comments. The ratings and comments were collated, and each section author was invited to revise their recommendations accordingly.

Next, the revised recommendations were discussed via two web conferences by all primary writing panel members until consensus was reached. There was also a discussion of whether there were any recommendations that should be added.

Rating Scheme for the Strength of the Recommendations

Not applicable

Cost Analysis

Cardiac Rehabilitation (CR) Cost and Affordability

For CR to be implemented in low-resource settings, financial resources must be considered. With data largely from high-income countries (HICs), CR has been demonstrated to be both effective and cost-effective. But what about other resource settings? In 2013, health expenditures accounted for 11.9% of gross domestic product in HICs but only 5.8% in middle-income countries (MICs) and 6.4% in low-income countries (LICs); in the same year, per capita health expenditures in low-income countries were US$37 (hence these countries are not a focus for the recommendations herein) and US$256 in MICs.

A recent publication has examined the costs and cost-effectiveness of CR in MICs suggesting that, as of 2015, there have been three publications with CR cost data, all from seven Latin American MICs, with another two publications from Latin American upper-MICs on the cost-effectiveness of CR. With CR programmes based on the typical supervised CR model in the USA (three times per week with telemetry; please note CR models delivered in other HICs, however, cost less), the mean 3-month CR programme cost data for the seven Latin American MICs was approximately US$360 to the public healthcare system. The cost-effectiveness of CR was estimated to be US$18,050 per life-year gained and US$22,560 per quality-adjusted life-year in Brazil and US$3156 per life-year gained and US$998 per quality-adjusted life-year in Colombia. According to the World Health Organization (WHO), CR in Brazil can be considered cost-effective at between one and three times the gross domestic product (US$11,200 in 2013) and highly cost-effective in Colombia at less than gross domestic product (US$7830 in 2013).

While CR may be considered cost-effective in the two Latin American upper-MICs, the mean cost for a 3-month USA-model CR programme to the public healthcare system in the seven MICs of approximately US$360 is 61% of the 2013 mean healthcare expenditure of US$590 in the same seven countries. For this reason, it is imperative that a lower-cost approach to CR be developed, implemented and tested, as is outlined in the abridged version of the guideline (see the "Availability of Companion Documents" field).

Method of Guideline Validation

Internal Peer Review

Description of Method of Guideline Validation

The consensus statement was independently reviewed by the advisory panel. It was also externally peer-reviewed through *Heart* and *Progress in Cardiovascular Diseases*. Comments were considered by the primary writing panel and revisions made accordingly.

Evidence Supporting the Recommendations

References Supporting the Recommendations

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Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

- Cardiac rehabilitation (CR) could represent an important approach to mitigate the epidemic of cardiovascular disease in lower-resource settings.
- CR, delivered to patients with stable angina through to myocardial infarction, and its sequelae, as well as those who have undergone an interventional procedure to ameliorate these conditions, reduces cardiovascular mortality by 26% and rehospitalisation by 18%.

Potential Harms

- It is important to appreciate that patients at both ends of the functional spectrum will present for cardiac rehabilitation (CR). Some will be able to perform exercise without adverse consequences (low-risk patients) and others will have very limited exercise capacity, active ischaemia, acute heart failure, significant arrhythmia or ventricular dysfunction (high-risk). Thus, the process of risk stratification is important. Wherever possible, high-risk cardiac patients (e.g., those with exercise-induced myocardial ischaemia with possible ST segment depression and/or angina pectoris) should be supervised during moderate exercise by a healthcare provider skilled in management of emergency cardiac events and principles of exercise prescription and patient monitoring in disease states.
- No studies have addressed the potential harms of mental health screening, such as false-positive results, the cost and inconvenience of additional follow-up assessments, the adverse effects or costs associated with treating incorrectly-diagnosed patients, and inappropriate labeling.

Contraindications

Contraindications

- Statin therapy is contraindicated in patients with known allergic reactions to statins, active liver disease, as well as in pregnant and lactating women.
- Recognized contraindications to exercise training include: unstable angina or acute myocardial infarction (MI), uncontrolled hypertension (HTN) (e.g., >180/110 mm Hg, or >100 bpm), symptomatic orthostatic hypotension <20 mm Hg, significant aortic stenosis, uncontrolled atrial or ventricular arrhythmias, sinus tachycardia >120 beats per minute, uncompensated heart failure (HF), third degree atrioventricular block, active endo/pericarditis or myocarditis, recent embolism, acute thrombophlebitis, acute systemic illness or fever, uncontrolled diabetes mellitus (DM) (glucose concentrations >16 mmol/L), severe orthopedic conditions that would prohibit exercise, and other metabolic conditions including acute thyroiditis, hypokalemia, and hyperkalemia.
- Contraindications to acetylsalicylic acid (ASA) include gastrointestinal disorder or bleeding and blood disorders.

Implementation of the Guideline

Description of Implementation Strategy

Adaptation of Cardiac Rehabilitation (CR) for Low-Income and Middle-Income Countries (LMICS)

There is now ample evidence that CR is equivalently effective in high-income countries whether it is delivered in a formal facility or through a home-based model. Clearly, delivery of CR without requirement for a facility and the associated costs would be much more feasible in low-resource settings. Box 2 in the original guideline document provides a case example of CR delivery in a low-resource setting. Refer to the original guideline document for discussions on the following topics related to adaptation of CR delivery for LMICs:

- Community-based CR
- Home-based CR
- Mobile technology
- Integration of CR within the primary health care system

Implementation Tools

Quick Reference Guides/Physician Guides

Resources

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Living with Illness

Staying Healthy

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

Grace SL, Turk-Adawi KI, Contractor A, Atrey A, Campbell NR, Derman W, Ghisi GL, Sarkar BK, Yeo TJ, Lopez-Jimenez F, Buckley J, Hu D, Sarrafzadegan N. Cardiac rehabilitation delivery model for low-resource settings: an International Council of Cardiovascular Prevention and Rehabilitation consensus statement. Prog Cardiovasc Dis. 2016 Nov-Dec;59(3):303-22. [171 references] PubMed

Adaptation

Not applicable: The guideline was not adapted from another source.

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Financial Disclosures/Conflicts of Interest

Each author of the guideline completed a declaration regarding any conflicts of interest. The co-chairs reviewed the declarations, and determined there were no relevant conflicts.

Guideline Endorser(s)

African Heart Network - Clinical Specialty Collaboration

Australian Cardiovascular Health and Rehabilitation Association - Professional Association

British Association for Cardiovascular Prevention and Rehabilitation - Medical Specialty Society

Canadian Association of Cardiovascular Prevention and Rehabilitation - Professional Association

Group of Cardiopulmonary and Metabolic Rehabilitation of the Brazilian Society of Cardiology - Medical Specialty Society

Groupe Exercise RÃ©adaptation Sport of the French Society of Cardiology - Medical Specialty Society

Grupo Interamericano de PrevenciÃ³n y RehabilitaciÃ³n Cardiovascular - Clinical Specialty Collaboration

Russian National Medical Society of Preventive Cardiology - Medical Specialty Society

Singapore Heart Foundation - Nonprofit Organization

World Hypertension League - Nonprofit Organization

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Guideline Availability

Available from the International Council of Cardiovascular Prevention and Rehabilitation (ICCPR) Web site .

Availability of Companion Documents

The following are available:

- Grace SL, Turk-Adawi KI, Contractor A, Atrey A, Campbell N, Derman W, Ghisi GLM, Sarkar BK, Oldridge N, Sarkar BK, Yeo TJ, Lopez-Jimenez F, Mendis S, Hu, Oh P, Hu D, Sarrafzadegan N. Cardiac rehabilitation delivery model for low-resource settings. Abridged version of guideline. Heart 2016;102:1449-55. Available from the BMJ Journals Web site .
- Cardiac rehabilitation delivery model for low-resource settings. Online supplementary file 1. Available from the BMJ Journals Web site .
- Cardiac rehabilitation delivery model for low-resource settings. Online supplementary file 2. Available from the BMJ Journals Web site .

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on April 4, 2017. The information was verified by the guideline developer on April 13, 2017.

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